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INTRODUCTION TO SOCIOLOGY. IV.¹

PART III. GENERAL STRUCTURE OF SOCIETIES.

CHAPTER IV. THE SOCIAL LIMITS.—*Continued.*

SECTION IX. DEMONSTRATION OF THE INDIVIDUO-COLLECTIVE PSYCHICAL LIMITS BY THE PATHOLOGY OF THE MIND.

A. *Insanity*.—The pathology of the mind furnishes us interesting indications of the support of the law of constant and necessary limitation of the intellectual phenomena as the most general condition of their equilibrium. There are all sorts of disturbances resulting from diseases of the mind. They are all more or less excessive oscillations of psychophysical activity and the return to an equilibrium distinctly inferior or constantly regressive in case the health is not restored. Ch. Ribot, Dr. Dallemagne, and Dr. Sollier, among many others, have introduced us to the diseases of the memory, will, and personality. They are all characterized either by an excess or a lack of normal limits, and by an abnormal concentration or decentralization of nervous structure and activity. Mental derangement is a breaking up of the equilibrium between the nervous system and the internal and external environment. The brain is not only related to the individual for whom it functions, but it is also related to the social environment; the latter furnishes the most exciting stimulus to its activity; it is the principal generator of excessive oscillations which can produce irregular functioning. The more an organ functions, the more susceptible it is to disease. Acute rheumatism occurs most frequently in the articulations of the legs and arms of manual laborers, and the brain of intellectual workers is more often diseased than among other classes of the population. The work of Broca in cerebral thermometry has shown that the temperature of the frontal regions is higher than that of the occipital. Mental labor increases the flow of blood to the brain, and consequently the chances of alteration.

¹Translated by EBEN MUMFORD.

Mental derangement is rare among animals and primitive peoples, whose activity is chiefly muscular and devoted to securing food. The same is true where there exist strong demarkations between classes of the population. Thus in 1862 in the United States the proportion in ten thousand insane was as follows:

Among the whites	-	-	-	-	-	0.75
Among the enfranchised negroes	-	-	-	-	-	0.71
Among the slave negroes	-	-	-	-	-	0.10

In France the proportion of insane in ten thousand was as follows:

Liberal professions	-	-	-	-	-	3.10
Officers	-	-	-	-	-	1.05
Non-commissioned officers	-	-	-	-	-	0.72
Merchants	-	-	-	-	-	0.42
Soldiers	-	-	-	-	-	0.33

In Paris there was 1 case of insanity for every 302 inhabitants; in the surrounding country, only 1 for 1,474. In Nancy the proportion was 1 to 500 inhabitants; in the remainder of the country, only 1 for 1,438 inhabitants. In general, the percentage of insanity increases more rapidly in France and Belgium than the population. The proportion of insane in France for 1,000 inhabitants was in:

1835	-	-	-	-	-	-	-	0.43
1841	-	-	-	-	-	-	-	0.58
1851	-	-	-	-	-	-	-	1.25
1880	-	-	-	-	-	-	-	2.37

In England from 1845 to 1879 the population increased 45 per cent.; the number of insane, 250 per cent., or more than five and one-half times faster. In Ireland the proportion of mental derangement was 0.76 per 1,000 inhabitants; ten years later, in 1871, 1.35 per 1,000. It is necessary to take into consideration that in twenty years two million individuals, forming the most energetic and healthy part of the people, left this unfortunate country.

In the United Kingdom, according to an official report, the following was the proportion of insane:

In 1862	-	-	55,525	for 29,197,737 inhabitants
1872	-	-	77,013	" 31,842,522 "
1882	-	-	98,871	" 34,788,814 "
1892	-	-	120,004	" 37,732,922 "

Or

In 1862	-	-	-	-	-	1.81	per 1,000
1872	-	-	-	-	-	2.17	" "
1882	-	-	-	-	-	2.89	" "
1892	-	-	-	-	-	3.18	" "

According to the official statistics of 1902, there was in England and Wales in 1859 only 1 lunatic for 536 inhabitants; in 1902, 1 for 298. In 1902, 110,713 insane were placed in asylums. According to the *Blue Book*, the factors causing this startling development were the following:

Excessive business cares	-	-	23	per cent.
Alcoholism	-	-	19.8	" "
Heredity	-	-	18.9	" "

These are the most general causes. Sex, age, occupation, and sexual passions constitute other factors—some biological, others psychic and in part social:

Disappointment in love, females	-	-	1.9	per 10,000
Disappointment in love, males	-	-	0.6	" "

The same statistics show that of 10,000 laborers in the cities, females show the highest proportion of insanity:

Female laborers	-	-	-	36.9	in 10,000
Male laborers	-	-	-	26.9	" "
Domestics in hotels	-	-	-	20.1	" "
Domestics in private homes	-	-	-	12.2	" "
Clergymen of the established church	-	-	-	12.0	" "
Catholic and dissenting clergymen	-	-	-	5.0	" "
Farmers and agricultural laborers	-	-	-	5.1	" "

Quetelet, in his *Physique sociale*, began to distinguish insanity from idiocy. In the former the overexcited brain goes beyond its physiological power; in the latter the arrest in the development of the organ has carried with it that of the intellect. For Quetelet, as for Esquivol, "the progress of civilization increases insanity." This thesis is only relatively true. Progress implies, in addition to social development, a very great differentiation

and also co-ordination, and a subsequent superior equilibrium. In reality, the development of insanity is peculiar to a crisis of development and differentiation destined to be extenuated more and more in the measure that the new equilibrium tends to constitute itself and to limit the pathological phenomena to the narrowest boundaries. From this point of view, for example, it is certain that economic crises exercise a considerable influence in causing insanity, and, unfortunately, in our most advanced societies the crises have become the rule; hence the continued growth of mental derangements, especially in countries possessing a high civilization, but a civilization not yet coherent. However, crises, although indicating generally a tendency to progress, can, in certain cases, correspond to a social retrogression. The development of mental derangement, then, is not necessarily in relation to the progress of civilization, but rather to a possible state either of dissolution or superior integration. The crisis is not, in the main, an essential element and characteristic of progress; neither is mental disease. It is not progress, then, which increases insanity, but the crisis which precedes either the progress or the regress. This is the case in Belgium, whose economic development, let us hope, will tend toward a superior social co-ordination where the perturbations, economic as well as mental, moral, and political, will necessarily be reduced. The following is a table of the insane of Belgium in institutions, not comprising, therefore, the insane living in their own families:

	Male	Female	Total
1835.....	2,744	2,361	5,105
1842.....	2,426	2,088	4,514
1853.....	3,630	2,277	4,907
1858.....	2,195	2,225	4,420
1883.....	4,454	4,039	8,763
1885.....	4,716	4,612	9,328
1890.....	5,453	5,324	10,777
1893.....	6,275	5,719	11,994
1894.....	6,372	5,908	12,300
1895.....	6,624	6,178	12,802
1896.....	7,037	6,278	13,315
1897.....	7,167	6,401	13,568
1898.....	7,473	6,749	14,222
1899.....	7,520	6,955	14,585

In Italy, *pellagra* accentuates the mental derangement brought on by the general misery which is regularly manifested in the most lamentable social convulsions. The number of insane in the asylums of Italy was:

	Men.	Women.
December 31, 1880 - - -	9,000	8,471
December 31, 1885 - - -	10,443	9,839
December 31, 1888 - - -	11,895	10,529

The proportion of insane in asylums for each 10,000 inhabitants was in 1883, 6.40, in 1884, 6.68, in 1885, 6.62. In France during the same year it was 13.11, 13.38, and 13.66; in Germany, 8.27, 8.42, and 8.35; in Cisleithan Austria, 2.89, 3.06, and 3.20. But it must be taken into consideration that the establishment of hospitals was not equally extended in 1885; while in Austria there were 26 and in Italy 77, in France there were 103 and in the German empire 244.

The following are the statistics for France, per 1,000 inhabitants:

	Idiocy.	Insanity.
1851 - - - - -	2	1.23
1861 - - - - -	1.11	1.14
1866 - - - - -	1.05	1.33
1872 - - - - -	1.14	?
1876 - - - - -	1.20	1.22

M. Levasseur thinks that these figures are too low. He shows that the number of insane is higher in the agricultural districts. Although, from the point of view of the extension of insanity, one cannot base his conclusions solely upon the number of individuals in institutions, the number of private and public asylums having increased, yet the progression can be considered as constant, and M. Levasseur thinks that the cases of insanity are much more frequent today than formerly, because of the passion for politics and of the fluctuations of riches. The following table gives the number of insane in hospitals in France per 10,000 inhabitants:

1835-39 - - - -	3.4	1861-64 - - - -	8.4
1840-44 - - - -	4.3	1865-69 - - - -	9.5
1845-49 - - - -	5.3	1870-74 - - - -	10.5
1850-54 - - - -	6.3	1875-79 - - - -	12.0
1855-60 - - - -	7.2	1880-84 - - - -	12.9

The sexes are affected in about the same degree. The social conditions, and especially the nature of the occupations, exercise the strongest influence. An observation of the 19,817 cases in 1853 in the asylums showed that, for each 1,000 individuals, the number of insane according to occupations was as follows:

Agriculturists	-	-	-	-	-	-	-	0.2
Merchants	-	-	-	-	-	-	-	0.4
Landlords	-	-	-	-	-	-	-	1.0
Industrials	-	-	-	-	-	-	-	1.1
State officials and employees					-	-	-	1.4
Domestics and day laborers					-	-	-	1.5
Soldiers and marines	-	-	-	-	-	-	-	2.0
Professors and men of letters	-	-	-	-	-	-	-	3.5
Physicians and pharmacists					-	-	-	3.8
Clergymen	-	-	-	-	-	-	-	4.1
Lawyers	-	-	-	-	-	-	-	8.5
Artists	-	-	-	-	-	-	-	9.5

Levasseur concludes that the development and exercise of the intellectual faculties is one of the predisposing causes of insanity and that, on the contrary, a life of comfort exempt from care and the quiet of agricultural life are causes of immunity.

The United States census for 1850 seems to confirm this opinion, but indicates also that the comfort of which Levasseur speaks is a state of relative stability and assured livelihood. This is, in fact, the case with the slaves, whose superiority in this respect would otherwise be inexplicable:

White population	-	-	-	7.6 insane per 1,000
Free colored population	-			7.1 insane per 1,000
Slave colored population	-			1.0 insane per 1,000

The pathology of the mind, better than anything else, or at least in a more striking manner, leads us, then, to a positive consideration of the social environment, both static and dynamic, in the study of which psychology in general is the natural preparation, for the reason that the central nervous system is the organ *par excellence* of the life of relationship, or the social.

Laying aside idiocy and epilepsy, the causes of which are principally hereditary, although more or less deeply social in their origin, we recognize that the principal causes of mental

derangement are found in diverse degrees: poverty, alcoholism, disappointment, superstition (principally religious), certain diseases arising from poverty and debauchery, economic and political crises, the repercussion of which acts with an incredible intensity on the mental and moral condition. If mental derangement seems proportional to the intensity of psychic function and the intensity of civilization, these sad digressions from normal life fortunately do not appear to be a fatality that civilization itself, by its progressive organization, may not be able to lead back to perturbations less excessive and to a more superior and stable equilibrium.

Thus in a social condition insufficiently equilibrated, mental derangement seems to be a real institution, the index to the intensity of the social troubles. It is the same with that other manifestation of individuo-collective disturbance which is shown by suicide and infanticide, which we shall study next.

B. *Suicide*.—Dr. Casper, in his *Beiträge zur medicinischen Statistik* (Berlin, 1825), has shown that the number of suicides is greater in the cities than in the country, and in 1827 Balbi, in his dictionary of geography, stated that the Russian empire had only one suicide for 149,182 inhabitants, or two and one-half times less than in France. The conclusion to be drawn from this is that suicide is a sociological phenomenon of which the factors are equally psychical, biological, and physical. The appearance of suicide is always in relation to the lack of equilibrium of some or all the factors which are represented in the nervous system of the individual, and which incite him irresistibly to seek an end for his misery in the simpler but inferior equilibrium which death promises him.

Let us note the contradiction into which Quetelet has fallen in his agreement with Lucrue and Caton, and we may add with Catholicism, and especially the doctrine of the Jesuits that "crime is not in the action, but rather in the intention of the one who commits it." This distinction is perfectly idle in speaking of suicide, which is neither good nor bad, but the end of all good and all bad. And how can society consider as criminal an act which is entirely its negation and its work, since the individual

in condemning himself acts only as the interpreter, the translator, of the sentence of excommunication pronounced against him by the arrest of destiny, by this lack of social equilibrium whose violent oscillations to a certain degree hurl the individual beyond the limits of society into the empire of death?

That which struck the first observers, like Quetelet, was the greater frequency of suicide in the most advanced civilizations, and within the same country in the urban centers. The explanation, like that in the case of insanity, was only the demonstration of a fact poorly analyzed—the pretended parallelism of progress and suicide, as of progress and insanity.

In France the number of suicides has progressed more rapidly than the population.

TABLE OF SUICIDES IN FRANCE.

1827-30, 1 suicide for 18,268 inhabitants	-	-	-	-	100 per cent
1831-35, 1 " " 15,369 " "	-	-	-	-	120 "
1835-40, 1 " " 13,033 " "	-	-	-	-	137 "
1841-45, 1 " " 11,598 " "	-	-	-	-	149 "
1846-50, 1 " " 10,274 " "	-	-	-	-	162 "
1851-55, 1 " " 9,557 " "	-	-	-	-	170 "
1856-60, 1 " " 9,480 " "	-	-	-	-	178.8 "
1861-65, 1 " " 8,021 " "	-	-	-	-	171.7 "
1866-70, 1 " " 7,948 " "	-	-	-	-	188 "
1871-75, 1 " " 6,716 " "	-	-	-	-	206 "
1876-80, 1 " " 5,897 " "	-	-	-	-	220 "
1881-85, 1 " " 5,133 " "	-	-	-	-	235 "
1886-90, 1 " " 4,500 " "	-	-	-	-	245 "

The growth of suicides has been continuous; it is, then, determined by constant causes. It shows a pathological condition coinciding with the lack of social equilibrium in France. This absence of equilibrium is manifested with greatest intensity in the centers. Thus from 1817 to 1825 the total number of suicides for the department of the Seine was 3,025, or an annual average of 1 for 2,400 inhabitants, while for France, as a whole, during the same period, the proportion was only 1 for 1,800 inhabitants. From 1827 to 1831 the total number of suicides in the same department was 9,040, or an annual average of 1,818. The increase in suicides has been much more rapid than that of the population.

SUICIDE IN BELGIUM.

In Belgium we find an analogous development, although in late years there seems to have been some amelioration in the sense of a lessening of the perturbations of the social life in relation to the diminution of suicides:

1871-80,	1 suicide for	-	-	-	12,146 inhabitants
1881-90,	1 " "	-	-	-	8,917 "
1891-1900,	1 " "	-	-	-	8,098 "

The progress, subsequent to the social troubles of 1886 and to the social legislation, still insufficient, which followed, corresponded also to the cessation of the economic depression. It seems, however, that it ought to be more especially attributed to the amelioration in the social legislation. In France, when the same kind of an economic crisis existed, and which passed away and was followed by prosperity, almost synchronous, the tendency to suicide, on the contrary, was not checked. The situation in Belgium, as in France, is, however, very precarious.

Sex also exercises an influence in causing suicide, although in its difference from insanity, which is especially passive, the primacy continues to belong to man. However, it is necessary to observe that in the new social conditions for women, and especially since the family has been injured by the régime of the large industry, not yet well organized, the situation of woman from the point of view of suicide has continued to draw nearer that of man.

The accompanying table gives periodical averages according to sex in Belgium.

The increase of the population in Belgium from 1831 to 1900 having been only 79.17 per cent., one sees that the increase of suicides in general, as well as among females, has been much more rapid. However, in the later years there has been a slow amelioration. As the increase of the population in general has been more rapid during the last decennial period than during that from 1880 to 1890, so there has been a decrease of suicide; the same phenomenon was observed from 1876 to 1886, a period of great industrial prosperity and equally remarkable for the relative diminution of suicides.

	Female	Male	Total	General Increase	Increase for Females
1836-39.....	?	?	178	100	?
1840-49.....	195	47	242	138	100
1850-60.....	225	51	276	195	108
1861-70.....	?	?	263	149	?
1871-80.....	373	68	441	248	143
1881-90.....	551	107	658	370	227
1891.....	648	120	760	432	255
1892.....	673	122	795	447	257
1893.....	746	119	825	483	255
1894.....	693	146	839	471	310
1895.....	660	152	812	456	325
1896.....	668	141	809	454	309
1897.....	607	145	751	422	310
1898.....	673	150	823	462	324
1899.....	643	138	781	439	308
1900.....	658	128	786	447	272
1891-1900.....	613	136	778	449	293

INCREASE OF POPULATION IN BELGIUM.

1845-56	-	-	-	-	192,364	4.44 per cent.
1856-66	-	-	-	-	298,273	6.50 "
1866-76	-	-	-	-	508,352	10.53 "
1876-80	-	-	-	-	183,824	3.44 "
1880-90	-	-	-	-	549,312	9.95 "
1890-1900	-	-	-	-	624,489	10.28 "

Thus in Belgium, while it has taken almost a century for the population to double, in the same time suicide has quintupled. The number of suicides of females tends to approach that of the males. Mental derangement then reaches the most conservative element of the population, and woman is dragged into the machinery of social transformation. Quetelet has insisted especially on the regularity of suicides, and even of the methods of suicide, in regard to which he gives statistics from Dr. Casper for Berlin. This regularity, it is true, is fairly constant during certain limited periods and for certain countries. He recognizes this when he says: "However, society may be modified in a country, and so bring about changes in that which at first manifested a remarkable constancy *for a limited period of time.*" But is there not proof here that the theory of averages can be applied to the conditions of civilization, that is to say, to social equilibrium, and is it not then capable of furnishing us with general and abstract social laws?

Quetelet gives the following table of suicides in Berlin from 1788 to 1822 from the statistics of Dr. Casper:

1788-1797	-	-	-	-	-	-	-	92
1797-1808	-	-	-	-	-	-	-	128
1813-1822	-	-	-	-	-	-	-	545

The Berlin of 1788 was profoundly changed in 1822. Quetelet in passing gives as his idea, since exaggerated by Tarde, that imitation is a factor in crime in general, but he does not go so far as to make it the exclusive and fundamental factor in suicide. "In studying," says he, "that which relates to suicides, to duels, and certain kinds of crime, we are disposed to believe that man often acts only through the tendency to imitate." Yes, but imitation does not explain the genesis of suicide and of crime, the conditions of which are sociological, that is to say, complex.

Let us not forget that the duel, for example, has been everywhere and for a very long time a veritable social institution of a juridical character, designed to decide processes of a certain nature, as we see it in the judiciary duel.

Following the example of Dr. Casper, Quetelet has also studied the influence exercised upon suicides by the seasons, by city and country life, by sex, age, celibacy and marriage. Unfortunately the strongest sociological influences, those exercised by economic conditions, were too much neglected.

TABLE OF SUICIDES IN FRANCE FROM 1835 TO 1844 TAKING INTO CONSIDERATION THE DIFFERENT AGES OF THE POPULATION.

Age	Female	Male	Proportion of Males and Females
Less than 16 years.....	0.1%	0.2%	3.27:1
From 16 to 21.....	5.7	3.5	1.84:1
From 21 to 30.....	8.3	8.0	2.86:1
From 30 to 40.....	8.1	9.7	3.57:1
From 40 to 50.....	11.9	12.8	3.19:1
From 50 to 60.....	14.0	13.2	2.80:1
From 60 to 70.....	16.7	15.7	2.78:1
From 70 to 80.....	18.0	18.5	3.05:1
80 and above.....	17.2	18.4	3.16:1
	100.0%	100.0%	Av. Rel. 2.95:1

Quetelet gives for the same period a table of the modes of suicide in France according to sex: drowning, strangulation,

fire-arms, poison, edged instruments, falls, etc. The striking fact is the constancy and regularity of suicides, as if the conditions were invariable: "One year reproduces so faithfully the figures of the preceding year that one can foresee what should happen the year following." It is, then, as possible to construct suicide tables as it is to construct mortality tables. But, of course, they must be for identical periods and allowances must be made for changed conditions and for cases of profound modification in the limits of oscillation.

Dr. Casper's table shows that the evolutionary variability is at least as remarkable as the static aspect of the phenomena, or rather that the static is a moving equilibrium.

The conclusion of Quetelet was that "under the influence of social causes which dominate us more or less, the same effects are reproduced periodically in the same order," and that "it is through a modification of the environment in which we live that the legislator can ameliorate the conditions of his fellowman." It is fair to add to these reflections that, even without the intervention of the legislator, the environment itself is modified spontaneously and regularly, for its equilibrium is, also, a living equilibrium; that is to say, it is always unstable, exercising an influence on the particular social phenomena.

SUICIDES IN BELGIUM ACCORDING TO AGE AND SEX.

AVERAGE FROM 1886 TO 1890			1898		1899		1900	
Ages	Males	Fe-males	Males	Fe-males	Males	Fe-males	Males	Fe-males
Less than 16 years.....	7	4	11	3	6	6	8	3
From 16 to 24.....	71	26	90	44	87	28	83	24
From 25 to 39.....	138	27	170	38	172	38	171	41
From 40 to 49.....	129	20	123	26	127	21	126	20
From 50 to 59.....	128	19	137	22	115	25	143	18
From 60 to 69.....	84	14	95	12	90	14	85	12
From 70 and over	35	9	46	4	43	6	39	10
Age unknown.....	2	..	1	1	3	..	3	..
Total.....	594	119	678	150	643	138	658	128

The above table of suicides in Belgium according to age and sex for the years 1886-90, and 1898, 1899, and 1900, com-

pleting to the end of the nineteenth century the table of Quetelet, will show how the statistics of suicide in relation to the statistics in general of this country have been modified in this interval.

The maximum of suicides occurs in the period from 1886 to 1890, between the ages of twenty-five and thirty-nine for both males and females. This is found regularly from 1898 to 1900 for males, but in 1898 the age is lower for women, though this phenomenon is not reproduced in the following years. It remains none the less an important index, which it is necessary to inspect.

I have already indicated that Quetelet, in this special case, has neglected too much the social causes, properly called, and especially the economic causes, the essential importance of which, however, he recognizes in general. Basing my conclusions on the general reports of the criminal courts in France from 1826 to 1880, and especially on secs. 11 and 12, I have stated in my *Lois sociologiques*¹ that the principal social conditions causing suicide are, in the order of their importance—excluding cerebral diseases, which also undergo the same influences—as follows: (1) poverty; (2) family difficulties and physical suffering, the influence of these two being about equal; (3) alcoholism; (4) love, jealousy, and debauchery; (5) the fear of legal prosecution. In general, then, they are: (1) physical and psychical disturbances; (2) economic difficulties; (3) genetic troubles; (4) moral difficulties. This natural classification of particular phenomena confirms my general classification of the social phenomena, following their order of increasing speciality.

The periods of economic crises, especially the financial crises, are naturally the most fruitful in suicides; the latter appear also when the social life is most unstable. In France the field for suicides *par excellence* is Paris and the department of the Seine.

When the unfavorable economic and moral causes become united, their concurrence acts powerfully on suicide. This is noticeable when one investigates the phenomena of suicide in

¹ Paris: Alcan; 3d ed., p. 122.

relation to the occupation followed and to celibacy and marriage. The family is a check to the excessive perturbations of social life. The following table will show, also, that relative to the population suicide is especially prevalent in the intellectual and liberal professions, for the reason that, in addition to general economic conditions, they are subject to a peculiar instability resulting from their speciality:

TABLE OF SUICIDES IN BELGIUM, ACCORDING TO OCCUPATION
AND FAMILY RELATION.

Occupations	Celibates	Married	Widower or Widow	Divorced	Unknown
1886 to 1890 (average):					
Agricultural.....	66	79	28	0	1
Commercial.....	32	56	14	1	1
Industrial.....	56	74	23	0	0
Intellectual and liberal.....	31	27	6	1	0
Unknown and others.....	91	80	35	1	10
Total.....	276	316	106	3	12
1898:					
Agricultural.....	81	73	22	2	0
Commercial.....	34	70	12	0	0
Industrial.....	99	111	35	0	0
Intellectual and liberal.....	43	28	4	0	1
Unknown and others.....	87	74	38	2	7
Total.....	344	356	111	4	8
1899:					
Agricultural.....	64	75	21	0	1
Commercial.....	42	51	12	1	0
Industrial.....	69	100	35	2	0
Intellectual and liberal.....	42	33	13	1	0
Unknown and others.....	99	76	37	0	7
Total.....	316	335	118	4	8
1900:					
Agricultural.....	64	66	22	1	2
Commercial.....	52	65	21	1	1
Industrial.....	74	131	38	3	0
Intellectual and liberal.....	23	24	6	0	0
Unknown and others.....	64	84	36	2	6
Total.....	277	370	123	7	9

In general, the conclusions relative to suicide agree with those which we have set forth in the consideration of insanity. Both are caused by disturbances of equilibrium, by excessive oscillation, attributable for the most part to the social condition.

As in the case of insanity, suicide is in reality an institution, a condition of equilibrium in an unstable state.

Insanity and suicide, in representing the most excessive oscillations of the mental order in relation to the physiological condition of individuals, are nevertheless rigorously limited and determined by the social environment and the physiological condition. By the latter they are connected with the most general laws of inorganic equilibrium and, in a manner still more simple, to those of mechanics by the intermediation of the muscular phenomena and organization of the individuo-social being or man. As M. Ch. Richet has well said :

The nervous system and, consequently, the psychical life, is subject to a simple and fundamental law ; cold paralyzes its activity ; heat exaggerates it ; but this is within very narrow limits. From this point of view, as well as from others, the nervous system is subject to physiological laws which resemble very much those of the muscles. Now, the function of the muscles is contraction, and the function of the nervous system is intelligence : heat, by exciting and then destroying the tissue, stimulates, but afterwards suppresses, the function. In both cases the origin of the force which is set free is in the interstitial combustion. It is impossible not to think that a phenomenon so rigorously subjected to this law is not a phenomenon, if not of the physico-chemical order, at least of the material order. Above 45° there is no intelligence and none below 0°.¹

Again all psychical manifestations, even the most complex, as well as organic and inorganic phenomena, can, from the point of view of general philosophy, be reduced to the simplest laws of movement, and sociology as well as philosophy seems to us more and more as a special and more complex application of universal order.

CHAPTER V. AGGREGATES.

SECTION I. STATICAL LIMITS OF AGGREGATES—DISTRIBUTION OF CLIMATE; ISOTHERMAL, ISOCEIMAL, AND ISOTHERAL LINES.

Up to this time we have studied separately (1) the character of aggregates considered as inorganic and organic masses ; (2) the natural limits of organic and inorganic factors considered *in abstracto*, that is to say, of bodies considered independently and where their elements are integrated. We shall now combine the

¹ *Essai de psychologie générale*. Alcan, 1891.

two factors—aggregates and limits—and show how, in reality, in a constant and necessary fashion, every mass is differentiated from the surrounding environment only by the condition of being limited. That which we have done from the point of view of mathematics, mechanics, astronomy, physiology, chemistry, biology, and psychology, we shall now attempt to do from the point of view of concrete phenomena, considered as masses, with which sciences equally concrete with the former are occupied: terrestrial astronomy, geology, mineralogy, botany, and zoölogy. We shall consider these phenomena then as masses delimited by zones from the *ensemble*.

In the chapter devoted to astronomical limits we have shown sufficiently that it is there that the best proof is found that the equilibrium of all bodies results from their peculiar composition in correspondence with the surrounding environment. This law of the general mechanics presided even at the formation of our planet. It is useless to dwell on this longer, if it is only to recall that the history of this formation is in relation to that of all beings and their distribution on the surface of the earth by a derivative factor—climate.

The earth, at first in a molten state, has been gradually cooling; at the same time, its crust has thickened, and the atmosphere, becoming less vaporous, preserves at its surface a lower temperature. We know that there have been successive phases of temperature, and that each of these phases has been marked by special modes of existence. Vegetable and animal forms appear only when the temperature is compatible with their life and the atmosphere contains more or less carbon and oxygen.

The distribution of fossils proves that this was comparatively late, *i. e.*, at the beginning of the Tertiary age. These were produced by a differentiation of zones and that of corresponding organisms. Thus mechanical and physical laws have determined the formation and consecutive differentiation of our planet:

1. Differences in the crust produced by cooling, prominences and depressions, mountains and valleys.
2. Shortening of the terrestrial diameter by cooling.
3. Appearance of water as a consequence of the lowering of

the temperature of the earth to a certain degree, the water up to this time having floated in a state of vapor.

4. Action of the water on the crust of the earth; leveling the prominences, and filling up valleys.

5. Appearance of organisms in the period when the earth is covered with water.

Organisms, in general, are composed largely of water, combined with other materials; they are all semi-fluid aggregates. The differences between the organic and inorganic are in the combinations of the constitutive elements and in the difference of movement. The number of elements to which all can be reduced is seventy-six, forty of which, the most important, suffice by their combinations to form the rocks, water, air, plants, and animals.

At the beginning of organic life the temperature on the earth was very high and very uniform. A marked lowering of the temperature at the two poles occurred, without doubt, at the beginning of the Tertiary period, and up to the time of the appearance of the first glaciers. Life had to recede or adapt itself to the new conditions. During the Quaternary age the temperature fell still lower. Northern and central Asia, Europe, and North America were covered with glaciers, extending from the pole to the Alps in Europe; likewise, starting from the south pole, there remained only an intermediate zone where organic forms could live; hence there was a large destruction or transformation of species. In the post-glacial period the organic forms returned toward the poles with their new characters and those which they acquired little by little in their journey.

The climate then was not divided into zones as it is now. Following the general law of structure, it was at first homogeneous; the vaporous atmosphere which at first enveloped the earth preserved the uniform temperature of a conservatory. Also all the sedentary formations of this period, Silurian and Devonian, contain a special flora and fauna, essentially maritime. Likewise each geological stratum, with its particular flora and fauna, has had its general environment and its corresponding climate. Homogeneity tends always to be more easily differ-

entiated as its mass is larger. According to the fossils discovered, it is certain that not only the general climate was modified, but that also local variations were produced. Animals whose remains have been found in countries now temperate, as France, Belgium, Germany, and England, could live only in tropical or, at least semi-tropical zones.

It is necessary to conclude from these prehistoric times, from the point of view of the philosophy of natural limits and social boundaries, that the temperature of the earth was modified at different times, and that each time the animal species have emigrated in harmony with these variations. Then naturally distinct vegetable and animal zones began to be drawn; in the beginning there were indeed, numerous zoölogical varieties, but their groupings were less distinct; promiscuity was their dominant character. On the contrary, about the time of the Tertiary and Quaternary epochs each continent had already its peculiar species.

During the Pliocene and post-Pliocene epoch the center of Europe seems to have been very cold; its temperature, from torrid, became glacial; the animals of this part of the earth emigrated toward Africa, while those of the northern countries took their places, returning to the places of their origin when the climate became milder.

The Quaternary period, which precedes ours, does not seem to be separated from the latter by any distinct variation; its fauna is allied to ours: there are developed here millions of mammalia and mollusks. Man is certainly a contemporary of this epoch, perhaps even of that preceding, at least as a transitional type.

Each place on the earth has its climate determined by a number of conditions, certain ones of which, however, can be considered as relatively general and permanent. The movement of our planet and its situation in relation to the sun are the general and constant external conditions upon which climate and temperature depend; the predominance either of water or land is the general and constant internal cause.

The maritime climate differs from the continental climate.

For the former, the averages for winter and summer vary little; for the latter, the divergence increases; the same latitude does not necessarily have the same climate. If, by a continuous line, we unite, on the globe, localities having the same average winter temperature, and by another line those having the same average summer temperature, we obtain two lines, the one *isocheimal*, the other *isothermal*, the curves and irregularities of which follow the unequal distribution of seas and continents. The *isothermal line* is that which results from the general average of the temperature for the year. Within the tropics the lines of latitude and the isothermal lines tend to coincide.

The maximum line of temperature cuts the terrestrial equator under the meridian of Singapore and Tahiti, traverses the southern portion of the Pacific Ocean, and the northern part of the Atlantic. The average temperature corresponding to this thermal equator is 28°80'.

In addition to the two fundamental, external and internal, causes indicated above, the average temperature depends, also, upon such particular causes as height above the sea-level, the hygrometrical condition, winds, some of which are more constant than others, and certain ocean currents, such as the Gulf Stream. The opening of the Isthmus of Panama, if it should modify the direction of this warm current, could influence the temperature of certain parts of Europe.

The earlier historians, philosophers, and political theorizers have generally accorded an excessive and too invariable influence to climate, not only on the distribution of the different varieties of the human species, but on their physical, moral, and intellectual qualities, and on the form of their governments. This influence is far from being unique and absolute; it is only relatively constant. The results of a more thorough observation of diverse civilizations in different times and places have reduced the influence of climate to more feeble variations. However, from the time of Herodotus and Aristotle to that of Montesquieu, it seems to have been given the dominant place, and such is still given it even in the eyes of some of the creators of the contemporary philosophy of history.

Certain climates, especially the humid and warm, favorable to a vegetable nourishment in relation to the nutritive life and chiefly muscular activity of primitive peoples, seem to have been the most advantageous environment for the formation of rudimentary societies. Whatever may be the action of the geographical structure, or the influence exercised by climate, or the variations of the human species, the latter belong to a type automatically and psychically uniform. It is, necessarily, from the mental and social point of view that its variations will be accentuated, its factors being the highest specialized and differentiated, and at the same time the least stable. But, on the other hand, by virtue of their complexity, they are also the most modifiable, being of such a sort that the result of the progress of civilization ought, naturally, to be the establishment of a higher level of progress with variations more multiplied, but also more feeble in intensity.

What was the location of the cradle of humanity; did its site depend solely upon climate? Has there been a single place of origin, or have there been various times and places? This question is hanging between the monogenetic and polygenetic hypothesis.

That which is important for positive science is to investigate what has been, in all cases, the necessary conditions for the appearance of man on the earth. This investigation can help in solving the controversy.

We now know that there exists a correlation among the following four factors: (1) The human dental system; it is analogous to that of the anthropoids. Primitive man was chiefly frugivorous. (2) The alimentary system, vegetarian. (3) The environment; the humid semi-tropical regions were the most favorable to an abundant vegetation. (4) The predominance of the muscular life over the primitive nervous and intellectual life; muscular life does not require food essentially nitrogenous. All these correlative, primitive, social conditions and types are still met with in the semi-tropical and tropical zones, especially in maritime regions.

In going toward the temperate zones, man becomes more

and more carnivorous; his activity is not solely muscular, but becomes nervous and cerebral, then psychic. The latter continues to increase in importance. Nitrogenous nourishment is required. Then man becomes carnivorous and omnivorous, preserving both of the dental systems of his ancestors.

Haeckel, who supports the hypothesis of the monophyletic origin of the human species, places the cradle of humanity on a continent now submerged by the Indian Ocean, which joins Madagascar and Africa on the west, India and Indo-China on the north; on the east it extends to the Philippine Islands and Borneo; on the south it extends to the tropic of Capricorn. This continent, Lemuria, was, according to him, the source of the different human species distributed over the surface of the earth. The Englishman, Sclater, has called this continent Lemuria after the prosimians which characterize it.

When he published his *Création naturelle*, Haeckel wrote (p. 613, French translation) that he placed, hypothetically, the first existence of man on this continent, part of which has disappeared and of which there remain only fragments in southern Asia and in the Indian Ocean. There was the first native land of man, of this hypothetical *Homo primigenius*, having descended from the anthropoid monkeys, but of which there are no fossil remains known. This intermediary form between monkey and man, according to his hypothesis, was very dolichocephalic and prognathic. His arms were relatively longer and stronger, his legs shorter and more slender, etc., etc. Although the existence of Lemuria is now considered sufficiently proved, this *Homo primigenius* has been discovered at Trimil, in one of the Sunda Islands in Java, and this *Pithecanthropus erectus*, an intermediate form between the gibbon and man, belongs to the Tertiary epoch. Thence, à propos of this discovery, G. de Mortillet, in *Formation de la nation française*,¹ draws the following conclusion:

Man, the product of slow transformations and innumerable and successive modifications arising in the origin of living beings, is a mammal occupying the summit of the animal scale. His immediate precursor is the *Pithecanthropus erectus* of Java, which has strong affinities with the gibbons and

¹ Paris: Alcan, 1897; pp. 221 ff.

anthropoids of southern Asia. It is then very probable that man originated in these regions. . . . With man begins a new geological division—the Quaternary.

The climate in relation to the dental system, the alimentary régime—in a word, with the internal and external conditions—has exercised, then, an incontestable influence on the evolution of the human species.

As for the great ancient civilizations, and those which have succeeded them, the same influences have continued to act, but they have followed more special and complex methods. It is necessary to reject, as inexact, the conception, still too generally accepted, of the general evolution of civilizations of the Orient and Occident. The evolution has rather been from the semi-tropical zone toward the temperate zone, and from the latter more and more to the north of the equator. All the great civilizations known before our era have been north of the equator, and have continued to move in a northerly direction as is shown by the following table:

Ancient Peru :	between 2° north lat. and 37° south lat.;	semi-tropical zone.
Ancient Mexico :	between 15° and 30° north lat.,	semi-tropical zone.
Egypt :	between 18° and 37° north lat. (not including the tropical regions outside its own civilization).	
India :	between the equator and 35° north lat. (not comprising the tropical regions outside its own civilization).	
Assyria and Syria :	between 30° and 38° north lat.;	semi-tropical zone.
China :	between 20° and 40° north lat.;	zone, semi-tropical and temperate.
Bactriana, Media, and Persia :	between 25° and 40° north lat.;	zone, semi-tropical and temperate.
Asia Minor :	between 36° and 42° north lat.;	temperate zone.
Greece, Thessaly, Epirus, Macedonia :	36° and 42° north lat.;	temperate zone.
Italy, from southern part of Sicily to the central Alps :	between 36½° and 46½° north lat.;	temperate zone.
Spain :	between 30° and 44° north lat.;	temperate zone.
Gaul :	between 44° and 52° north lat.;	temperate zone.
Brittany :	between 50° and 55° north lat.;	temperate zone.
Germany :	between 48° and 56° north lat.;	temperate zone.
Scandinavian countries and Russia (European) :	between 45° and 70° north lat.;	temperate zone.

The whole of Europe is comprised between the isotherms of

20° and 0° centigrade. In Asia and America this zone of favorable social conditions is only one-half as large. While civilization moves northward from the semi-tropical zones above the equator, it also tends to develop in the semi-tropical zones north and south of the equator, and even in the south temperate zones.

South of the equator it is Africa which has the warmest average temperature (29° to 50°), a condition almost as unfavorable for civilization as excessive cold. The nature of its climate, together with the small development of its sea-coast relative to its continental area—a development inferior to that of Asia, North America, South America, Australia, and especially of Europe—explains the backwardness of the civilization of the greater part of the continent, save in the north and south. In order to draw it into the current of civilization, Europe must take it in tow, unfortunately in a manner generally too violent, and of such a nature that it lowers its appropriate moral value and civilization.

The geographical structure and limits of the earth, however, must be considered as only relatively constant. The whole surface of the globe was originally aqueous. It is, also, necessary to recall that, since the appearance of land, certain portions have sunk, making place for the seas, while others have risen. The Mediterranean was once an inland sea, and then in the place of the Straits of Gibraltar there was an isthmus joining Spain to Africa. Since the appearance of man, England was united to the continent, and Europe was joined to the northern part of America. The South Sea once formed a vast continent, of which the present islands were mountain peaks.

In the place of the Indian Ocean there was, perhaps, a continent along southern Asia from the Sunda Islands to the shore of Africa. We have seen that this was Lemuria, where man originated.

On the other hand, seas were replaced by land, with inland lakes, such as certain deserts of Africa and Asia. Ancient Iran evolved about one of these large lakes, now transformed into a desert. The waves continually wear away certain shores and

extend certain others. Although the geographical structure changes incessantly, it can be considered as one of the relatively constant factors of the structure, and consequently of the limits of the distribution of societies. In all cases, the social boundaries are always in constant relation to the geographical limits, and move, or at least are modified, in connection with the latter.

If we take a glance at the present geographical structure of our globe, we note that the solid portions are divided into three large masses, separated by the oceans. Europe, Asia, and Africa form the oriental mass of the globe; the two Americas, the occidental mass. Australia, the smallest of the continents, forms the southeastern portion of the ancient world. Around these three continental masses emerge islands, generally united in groups or archipelagos. These are usually lands torn away from the continents. Certain ones have been produced by upheavals.

The total continental land area is about 4,000,000 square kilometers; that of the islands, 200,000 square kilometers. Asia is larger than Europe, Africa, and Australia together. The area occupied by water is much larger; it is :: 2.8:1.

If one passes a meridian through the island of Ter, the oriental hemisphere, from the point of view of land, is to the occidental :: $2\frac{1}{2}$:1; likewise the northern hemisphere is to the southern, the two being separated by the equator, :: 3:1.

Thus our globe is divided into two hemispheres, chiefly water, but one of which is more continental than the other. Geographers divide the globe into two hemispheres, still more distinct, the one being terrestrial, but where the water is still to the land :: 1.22:1, the other being aquatic, where the water is to the land :: 11.3:2. This classification is at least as natural as the preceding, and aids in the interpretation of the evolution of societies according to their situation in one or other of these conditions.

In all these cases the earliest origins and the most general present conditions are aquatic. Certain terrestrial mammals, as the whale, have returned to their liquid element. Other animals are amphibious; man has carried everywhere, in himself, his

liquid environment; we know that the human body contains a larger portion of liquid than solid material; it is about 65 per cent. water; the later is to the solid substance as 1.54:1. This environment accompanies each of us, in the same way that the land and the seas accompany humanity. We, indeed, complete our ancient maritime environment by the indispensable saline elements in our food, which enter into our constitution.

This static correlation between humanity and the geographical structure seems to have been seen by Plato. When speaking of Greek civilization, more maritime than all others because of its shores and islands, he said: "We are seated on the shore like the frogs around a swamp;" and also by Strabo who, observing this same static relation between the geographical condition of Greece and its civilization, said that the Greeks are "Amphibians." What for these ancient thinkers was, doubtless, only a figure is, indeed, a reality.

The natural islets emerging from the waves, the artificial islets created later in the midst of lakes, the banks of rivers, later those of the large rivers and their deltas, then the shores of the inland seas, and finally those of the large oceans, were the successive steps of civilizations in correlation with the geographical structure. Each of these natural limits was transformed, successively, into means of more extended communication up to the intercontinental structure, at the same time geographical and social, which has been increasingly maintained in the last four centuries, transforming the structure and function of boundaries of societies, and so necessarily their philosophy.

The frontier, the external limit of attack and defense, has been transformed into an internal organization for protection of the group and development of the interior; in the degree that the external barriers are broken down by the intersocial relations, this protective membrane, so to speak, disappears and is transformed into intersocial organs; the envelope becomes more and more distant from the internal co-ordinated centers. The function of protection is not suppressed, but simply modified. The function persists and is constant; its forms vary.

SECTION II. GEOGRAPHIC, OROGRAPHIC, AND HYDROGRAPHIC DISTRIBUTION.

Now that we have discussed the constant and necessary limits of all the abstract elementary forces which enter into the composition of social tissue and contribute to its equilibration, we can look at these forces in their structure as a whole, as masses of territory and population, and see how the latter are composed in their natural distribution.

The two Americas are united by an isthmus, and continued toward the east by the archipelago of the Antilles, and toward the west by the peninsula of California. In like manner, Europe and Africa were united by an isthmus, now destroyed, but the apparent remains of which are the point of Italy, Sicily, the island of Malta, and the peninsula bounding Cape Bon. The archipelago here corresponds to that of the Antilles, and Spain and France correspond in their structure and peninsular situation to that of California.

For Asia and Australia the cataclysm has been more complete, the whole continent having been parceled out; Australia is the principal vestige. The archipelagos of the Philippines and of the Moluccas correspond to the Cyclades and the Antilles, and Arabia corresponds to the Spanish-French peninsula and to California.

To summarize, the earth has a geographical structure as a whole, an incontestable symmetry, the result of forces which have concurred in its formation. This symmetry has undergone and continues to undergo variations, not only local, but also general. Both have produced upon the animal populations corresponding variations. These variations are, however, dominated and limited by the constancy and regularity of the geographical structure as a whole, which itself is determined by the most general laws of universal mechanics.

The fact that the present continental masses were, at a certain period, attached to one another, and the existence, at present, of a submerged continent, renders possible the hypothesis of the appearance of a unique couple of beings, descended from the anthropoids, and which, being reproduced and ameliorated by

natural selection, have extended over the surface of the earth, adapting themselves successively to special environment, and following directions the general order of which can be approximately indicated.

Abstract sociology, however, does not need this hypothesis; it is sufficient to recognize the constant order which appears in the geographical structure of the globe, and even in its variations; it suffices for it to make clear the fundamental unity and identity of the human species, despite its accessory variations, which, from all points of view, biological, psychical, and social, are limited; finally it suffices for it to be able to determine what the environments are, especially climatic and alimentary, which correspond to the anatomical, intellectual, and social conditions of primitive man.

We can, then, with reference to this last feature, define the geography of the *ensemble* in showing that the ancient world extended from east to west over half the globe, but occupied, with respect to latitude, a much narrower space. The northern continents have been more extended and developed; they are distinguished by a greater continuity of mainland, by a greater variety of contour, by a multiplicity of gulfs and inland seas, islands, and peninsulas. To the south all is massive and narrower; the internal and external structure is simpler and less varied. Man has not been able to develop himself there. It is, especially, in the northern continents that humanity has become differentiated, developed, and highly organized.

If the oceans and seas furnish the most natural and general divisions of the different parts of the globe, the most special divisions result from the relief of the soil. Here let us observe, if not a configuration of the *ensemble*, absolutely uniform, yet, in all cases, general, co-ordinated systems of the greatest importance for social statics, and especially from the point of view of the distribution of natural limits, transitory or not, for the population. This solidarity of geographical and orographical systems is the basis for the constant solidarity, past and future, of societies—a solidarity affirmed both by their effective relations and by the absence of these relations. This solidarity in

fact, establishes also among them a relative conformity of structure and life.

In Asia and Europe the direction of the mountain chains is chiefly from east to west; this natural phenomenon is important. It is in relation to the direction of the rivers and valleys, and it explains the migrations, slow or rapid, peaceful or violent, of Asia and Europe.

In Africa, America, and Australia, the general orographical division is from north to south, save the Atlas, which is attached to the European system, as, indeed, the country itself is allied to Europe by the nature of its climate, vegetation, population, and history.

As for the division in use between Europe and Asia, it is arbitrary. From the Pacific to the Atlantic, by the Atlas, the Thian-Chan, the Kuen-Lun, the Himalayas, the Caucasus, the Taurus, the Alps, the Carpathians, and Pyrenees, the chain is continuous, the system is unique. Europe is dominated orographically by the Asiatic system, of which it is the continuation; the imperialism of Russia and Turkey still links it to Asia and its system of absolute monarchies, to the tradition of which even republican France is subjected. Furthermore, in Europe as in Asia, the ramifications of the principal peninsulas which project from the central trunk, such as Kamtchatka, Corea, the two peninsulas of India, Arabia, Italy, and Scandinavia, run from north to south. Only the Ural, from the Ural sea to the gulf of Kars, constitute a natural barrier to the direction of ramifications, indicated above between Asia and Europe.¹

This general orographical structure, with its special, though regular, ramifications, has exercised considerable influence, not only on the direction of civilization as a whole, but also on its particular forms and tendencies. In the valleys, large or small, bounded by mountains, groups are nomadic and isolated, living during the centuries in isolation from one another, and producing varied social structures. The homogeneous and successive waves of immigrations are divided into small groups; varieties,

¹ ELISÉE RECLUS, *Géographie universelle*; HOUZEAU, *Histoire du sol de l'Europe*; A. MAURY, *La terre et l'homme*.

racés, and nationalities are accentuated by this isolation. This was notably true in central and southern Europe. Greece and Germany are striking examples of this. Nevertheless these variations are accessory; what dominates is the dependence of all parts of Europe and Asia upon the general orographical system. The same is true of Belgium, which, because of its plains and mountains, belongs to this general structure of Europe and Asia; it is attached to the Cimbric plains up to the Ardennes; by the latter it is strongly united to the Alps; beyond the Ardennes, it is joined to the Lorraine and the Bourgogne, that is to say, to the Mediterranean watershed which inclines Europe toward Africa. In its geography and orography rest the early foundations of its civilization, not only local, but also international.

The mountains furnish the natural and the most persistent limits of territory and of populations; they are the separating walls. In the mountains vanquished peoples take refuge; here are conserved in a tenacious manner, secure from the military and authoritative influences of the conquerors, the communal and liberal, rigid and narrow, forms of societies which have come in this manner to escape the despotic evolutions almost universal. As for the subjected peoples, they are usually huddled together in the valleys, or give themselves up to peaceful labor, while their conquerors are installed on the high plateaus. Often, after centuries, the larger societies forced themselves out of their conquered condition, and, throwing off their despotic structure, sought to adopt the more liberal forms of organization of those peoples whose isolation had made them more independent. The influence of these groups can become more considerable as, in the course of civilization, the military societies, already based on a division of labor, more particularly military and industrial, are themselves transformed into peaceful societies, possessing political and nominal equality. Switzerland, for example, a veritable nucleus of Europe, with its many valleys and mountains, exercised this beneficent influence on France in the eighteenth and nineteenth centuries, not only by its own evolution, but also by its educative and reformative influence.

Other natural separations, still more insurmountable than the mountains, are the deserts, such as the Sahara. Sea and desert seem to have the same signification in the ancient languages: *mare*, "sea," in Latin, in Sanscrit, *maru*, "desert." In Asia it is necessary to note the steppes, which extend into Europe, and especially the salt desert, which replaced the inland sea around which evolved the primitive tribes of Iran before they were dispersed in different directions. In India are the jungles which were an obstacle to the formation of national unity and favored the successive conquests of the country by isolating and dividing the particular resisting forces. In America are the *pampas*, where the wandering habits of the primitive hordes are still preserved.

The forest regions can also, in certain conditions, serve as limits and obstacles. Those of Belgium, Gaul, and Germany presented the same difficulties to the Romans as the American and African forests have in more recent times presented and still present.

After mountains, deserts, forests, seas, and oceans, the rivers, especially the larger ones, are the most natural separations. Like the mountain chains, they form great lines of division, each having its original constitution. One fact is important: often the bed of a river cuts through a mountain chain, whose walls, then become perpendicular to the river bed as, for example, the Rhine, and also, in the upper part of its course, the Meuse. This is a favorable factor in the development of social structure and mass; in fact, at a certain time the river will become a means of communication between regions previously isolated by the mountains which it pierces like the tunnels artificially made later.

Generally, in the upper part of the course, the slope of the river bed is large, the banks high and steep, the width small, and the current more or less violent, according to the height of the mountains where it has its source. In countries like Switzerland, where several streams have their sources in the mountains, these complications are added to other natural causes of the isolation of local civilizations.

The floods and inundations of rivers and the large marshes

were also factors of isolation. In Europe they were inconsiderable in comparison with those of Asia and America; the Brahmaputra and Ganges in India, the Hoang-Ho and the Yang-Tse-Kiang in China, the Paraguay, Amazon, and Parana in South America, and the Mississippi in North America were, for a long time, and still are, hostile elements to the extension of social relations, although, like all others, they may have been able to favor the earlier settlements.

The prehistoric civilizations on small rivers seem to have preceded those on the large rivers and lakes, then came those of the inland seas; finally, when civilization became world-wide, the large oceanic social structures appeared, those on the inter-continental seas, and in this sense equally inland. Today the most important cities, notably almost all the capitals, are on rivers or on seas having a direct or indirect outlet to the oceans. The oceans, formerly natural barriers, have been transformed into organs of co-ordination of all civilizations—of things, ideas, and men. Thus the foundations of a unified social structure have been constituted, and the different stages of which, limited less and less narrowly by conditions at the same time constant and variable, but whose continued development, although world-wide, is none the less limited in time as well as in space by the extent and permanence of the planet.

The civilizations in the deltas of the large rivers, such as the Egyptian, Assyrian, and Chinese, and later that of Italy, Gaul, and Germany, required a large collective development, in extent, duration, and intensity; they necessitated, in fact, the enormous work of generations, collective, simultaneous, and successive, such as canals, embankments, roads, etc. But let us note the difference: formerly this work was performed by slaves or by conquered peoples; now, as for example, in Holland there is a veritable little republic, with or without central administration, which administers and directs all the work relative to the maintenance of embankments. In a part of Belgium and Holland this requires constant work and a natural community of effort, surveillance, and direction. Thus each *polder* forms a sort of civil person (*wateringue*); it is administered by a council elected

by all the proprietors of the *polder*; this is the executive council of the little agricultural republics, which orders and directs the necessary work; the cost of the latter is defrayed by a contribution proportionate to the extent of each individual's property.¹

However, besides these variable methods represented by Egypt on the one side and Holland on the other, we recognize here again a constant statical law of the relation of work to the environment; in the species it is the necessity of collective work imposed by the conditions of the natural environment. This large co-operation, servile or voluntary, which requires the placing of *deltas* in civilization, is recompensed by their superior fertility; it contradicts the too absolute law of Ricardo in showing that if the most fertile lands are first placed under cultivation, it is only these which present this character *relatively* to each state of civilization and the means of which it makes use. The most fertile lands have been for a long time the least accessible to cultivation; placing them in cultivation produced subsequent progress. Thus the deltaic civilizations, despite the great antiquity of some of them, belong to a relatively modern period. This was the case for the Nile, Euphrates, Tigris, Po, Rhone; and, in later times, for the vast and unique delta formed by the Rhine, the Meuse, and Escaut. These deltas, as well as many others, have been, still are, and will be more and more, as in India, China, and the two Americas, the seat of large societies; they will facilitate communication between the different civilizations and the different varieties of the human species.

Thus, social statics, with its particularities always present, although often attenuated and transformed, is resolved finally into universal statics, of which the geographical, orographical, and hydrographical structure appears like tissue, at the same time bony and fluid, not external and distinct, but internal to the larger human society and the innumerable societies, of varying degrees of complexity of structure, which compose it. The seas and oceans, the valleys and mountains, etc., form an integral part of human civilization in the same way that the shell forms a part of the tortoise, the skeleton of man, and the

¹ E. DE LAVELEYE, *Rapport au congrès agricole de Paris*, 1878.

gas and liquids a part of animal substance. The theater of humanity is inseparable from the actors who play the drama or the comedy of life; as man carries in himself his aquatic environment, so the adaptation of society to the whole of nature is not solely figurative, but real, that is to say expressed by organic laws such that each society appears to us like a combination sublimated from all the organic and inorganic elements of the world, and sensitive even to the highest degree of conscious sensibility, and, indeed, methodical.¹

SECTION III. THE DISTRIBUTION OF MINERALS.

Although the term "mineral" may be independent of the notion of solid bodies, the water of the sea and the air containing minerals, yet in general minerals are dependent upon certain lands to which their distribution is intimately allied. Their zones of distribution, are, then, delimited by the geological strata. Nevertheless, as the latter vary with small distances, so the mineral aggregates seem to have a distribution as incoherent as the formations themselves. One does not observe, at first, these general laws, which are more striking in the distribution of the flora and fauna. Nevertheless, this relation between the nature of lands and the existence of different minerals is a constant law of inorganic nature, a law which is in turn in relation to the conditions of social existence and evolution.

The form of the minerals themselves is not essentially constant; it depends chiefly on the temperature. The most of them may pass from a solid to a liquid or gaseous condition. Yet with the temperature now existing at the surface of the earth, these inorganic bodies remain almost constantly in one or the other of these three conditions. Those which have the solid form are the most numerous.

The co-existence of the usage of certain minerals with certain stages of civilization gives to societies a special industrial structure; stone, iron, copper, gold, silver, and coal have played and still play a considerable rôle in the evolution of societies. From the point of view which we take, it is necessary to note that they

¹ ELISÉE RECLUS, *Géographie universelle*; HOUZEAU, *Histoire du sol de l'Europe*; A. MAURY, *La terre et l'homme*; METEKNIKOFF, *La civilisation et les grands fleuves*.

aid at a certain time in the formation of industrial zones, at least in part different from the zones purely military or political, the contact of which with other zones creates, at once, either new conflicts and barriers, for example the customs, or new communities of effort based on the division of social labor.

The dispersion even of minerals, equally necessary, in the different centers, is a favorable factor in social cohesion; it is opposed to the selfishness and isolation of societies as well as to the exclusive monopoly of one to the detriment of another. In prehistoric times the existence of certain kinds of stone in certain regions, and the manufacture of stone implements and weapons, established relations between groups less favored under this relation and the first industrial centers.

Iron is found in Asia, Mexico, the Argentine Republic, France, and Germany; copper on Lake Superior, in Cornwall, Saxony, Savoy, Piedmont, Sweden and Norway, Hungary, and Russia; silver, in Suabia, Saxony, Bohemia, Norway, Spain, the United States, Peru, Mexico, Chili, and Bolivia. Silver is essentially an American product. In 1895 out of 5.3 million kilograms of refined silver, America produced 4.4 millions, or 83 per cent. of the total. Australia, which ranks next to America, produced only about 500,000 kilograms.

Concerning the production of gold, M. de Foville, in his work on the "Géographie de l'or," printed in the *Annales de Géographie*, May, 1897, classifies the centers of production of gold according to their proportional importance at this time in the following manner, letting one square centimeter represent the value of twenty millions:

	sq. cm.		sq. cm.
United States of America,	241.5	Canada - - - -	10.0
Southern Africa - - -	240.0	Japan and Corea - - -	8.0
Australia - - - -	231.0	Venezuela - - - -	4.5
Russian empire - - -	156.0	Chili - - - -	5.0
Mexico - - - -	30.0	India (Dutch) - - -	3.5
China - - - -	30.0	Guiana (Dutch) - - -	3.0
India (English) - - -	25.0	Central America - - -	2.5
Columbia - - - -	15.0	The Gold Coast - - -	2.0
Guiana (British) - - -	12.0	Ethiopia - - - -	2.0
Guiana (French) - - -	12.0	Madagascar - - - -	2.0
Brazil - - - -	11.5		

Platinum is found in Columbia, Brazil, Hayti, Canada, Borneo, and in the Ural.

Finally, coal which supplies our economic and domestic life, abounds in Virginia, Pennsylvania, New York, Argentine Republic, Peru, New Zealand, China, Siberia, northern Hindoostan, in France, in Northumberland, Staffordshire, Lancashire, in Belgium, and in the Rhine provinces.

Each of these mineralogical zones coincides with special industrial zones which are formed in proportion as each kind of mineral is susceptible of being socially utilized; each coexists with societary structures, at first local and narrowly limited; but we see these local centers gradually blended into a general and common activity. Gold and silver, for example, are drawn into the stream of universal circulation, into the service, not of isolated societies, but of a civilization the circle of which increases every day. They become special organs in the service of international economic life, and not solely of national life, to such a degree that they are not always and necessarily the most abundant in the countries which produce them.

Modern industry, with its increasing division of labor—which, however, is only the negative aspect of an equally increasing co-operation—becomes a substitute, in part, for the natural dispersion of the mineral beds which feed a progressive and superior concentration, which implies an increasing lowering of the natural limits in accordance with that which we have already observed from the purely geographical point of view.

When to the heat and motor force derived from combustible minerals electricity was added, then the world was ripe for its unitary and conscious life.

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[*To be continued.*]